

Application No.: 10/690,088

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Remarks

Favorable reconsideration of this application in the light of the amendments and the following discussion is respectfully requested. Claims 1-14 remain pending in this application.

Objection to the Specification

The disclosure was objected to based on the following asserted informalities:

(a) On page 9 at lines 19 and 20, both recitations of "hydro peroxide" are improper and should be changed to "hydroperoxide" without using a space in-between according to traditional wording. Reference is made to the Aldrich chemical catalog for the correct name.

(b) On page 9 at line 12, recitation of "thiosulfates" may be wrong. It is suggested that this language may be changed to "thiosulfites." since only sulfite-related reducing agents are involved on lines 11-12.

(c) On page 16 at line 18, page 17 at line 12 and page 18 at line 31, all recitations of "vinylidenedifluoride" are improper and should be changed to "vinylidene fluoride" since it relates to monomer VDF. Please refer to Claim 8 at line 2 for a correct name. It is asserted that otherwise, one having ordinary skill in the art may confuse it.

Response to Objection to the Specification

The Specification has been amended to substitute the language preferred by the Examiner for that originally found in the specification. Withdrawal of the objection is therefore requested.

Claim Rejections – 35 USC 112

Claim 11 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention.

Specifically, it is asserted that the term "substantially" on line 2 of claim 11 is a relative term, which renders the claim indefinite. It is asserted that the term "substantially" is not defined by the claim or any dependent claim for the low and high limit, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention, referring to MPEP § 2173.05(b). It is

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noted that the other term "substantially" used in Claim 1 at line 2 has been well defined on page 2, line 26 - page 3, line 9.

Response to Claim Rejections – 35 USC 112

Claim 11 defines a process according to claim 1 wherein the copolymer has a melting point of less than 200°C or wherein the copolymer is substantially amorphous. It is well appreciated by those skilled in the art that a polymer that is "substantially amorphous" may have some small degree of molecular order. As noted in the specification at page 11, lines 25-27, "Fluoropolymers produced with the process of the invention may be used to make fluoroelastomers, in particular when the fluoropolymer is amorphous *or substantially amorphous such that the fluoropolymer hardly shows a melting point.*" [emphasis supplied]

As noted by the Federal Circuit, "Expressions such as 'substantially' are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention. Such usage may well satisfy the charge to 'particularly point out and distinctly claim' the invention, 35 U.S.C. § 112, and indeed may be necessary in order to provide the inventor with the benefit of his invention." *Verve LLC v. Crane Cams Inc.*, 65 USPQ2d 1051, 1054 (Fed. Cir. 2002).

Claim 11 sufficiently defines "wherein the copolymer is substantially amorphous" so as to comply with 35 USC 112, second paragraph, and the rejection should therefore be withdrawn.

Claim Rejections - 35 USC 103(e)

Claims 1-14 stand rejected under 35 U.S.C. 102(e) as being anticipated by Saito et al. (US 6,716,942 B1).

With regard to claim 1, the Examiner takes the position that Saito et al. disclose that various types of fluorinated copolymer's such as tetrafluoroethylene (TFE) with propylene can be prepared through emulsion polymerization process (column 3, line 61 — column 4, line 11; column 1, line 17-41; column 10, line 19-32; column 6, line 1-32; column 3, line 61 -- column 5, line 63), and that Saito et al. further disclose an inactive fluorocarbon can be presented in the reaction field with the polymerizable fluorinated monomer in order to obtain a higher molecular weight since the produced polymer does not dissolve in the reaction system "completely" and is

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in a "dispersed state." It can be tetrafluoroethane or trifluoroethane specifically (column 6, line 33-36; column 3, line 65-67; column 2, line 53-60). It is also alleged that Saito et al. disclose that the polymerization can be carried out by any of batchwise, semi-batchwise and continuous methods, and initially can put one fluorinated monomer with above-mentioned inactive fluorocarbons into critical pressure and temperature for polymerization. Therefore, the polymerization process is said to read on the presence of both fluorinated particle and fluorinated liquid. With respect to emulsifier-free emulsion polymerization, the Examiner concludes that Saito et al. have disclosed emulsifier or surfactant is not required in such emulsion or suspension polymerization (column 1, line 17-54; and see working examples).

The Office Action further refers to some of the dependent claims as follows:

Regarding Claim 6, inactive fluorinated liquids are delivered into the reactor' by conventional way used in order to obtain critical state (see working examples).

Regarding Claim 10, fluorinated vinyl ethers are included (column 4, line 10-27).

Regarding Claim 11, some of the copolymers obtained from Saito certainly carry the claimed melting point and are substantially amorphous.

Regarding Claims 12 and 13, examples of the radical polymerization initiators are organic or inorganic peroxide, persulfate, azo compound, and the like; they are conventionally used in the art and are thermally initiated (column 8, line 43 -- column 9, line 39).

Regarding Claim 14, one example of copolymers is from tetrafluoroethylene (TFE) and propylene and can be prepared in the mole ratio of 1 to 99/1 to 99 (column 6, line 17-18).

With regard to the remaining dependent claims, 2-5 and 7-9, the Office Action merely states that they "are thereby rejected with the above rejection for Claims 1, 6 and 10-14."

Response to Claim Rejections - 35 USC 102(e)

Applicants have discovered and have defined in claim 1 a process for making a copolymer of fluorinated olefin and hydrocarbon olefin selected from ethylene, propylene and mixtures thereof, the process comprising a substantially emulsifier free aqueous emulsion polymerization of said fluorinated olefin and said hydrocarbon olefin and wherein said process comprises copolymerization of said fluorinated olefin and hydrocarbon olefin in the presence of

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fluoropolymer particles and/or in the presence of fluorinated liquid that is in a form suitable for improving the copolymerization of said fluorinated olefin and hydrocarbon olefin.

In contrast to the inventive aqueous emulsion polymerization process defined in claim 1, Saito et al. is directed solely to polymerization *in supercritical media*, sometimes referred to as supercritical fluid polymerization. During such polymerizations in supercritical media, the formed polymer is either dissolved (and hence there is solvent polymerization) or the formed polymer is insoluble (and hence precipitates so that there is suspension polymerization). Thus, Saito et al. fail to describe any aqueous emulsion polymerization processes, other than the cursory mention of emulsion polymerization as one of the prior art methods of preparing fluoropolymers (column 1, lines 17-27, "Hitherto preparation of fluoropolymers has been carried out by emulsion polymerization or suspension polymerization ...").

Thus, Saito et al. suggest only suspension or solvent-polymerization under supercritical conditions, where either a liquified monomer or a liquified fluorocarbon acts as the supercritical polymerization media; Saito et al. fails to teach an emulsion polymerization process. Moreover, Saito et al. teach away from the use of water, noting that "it is rather preferable to make water absent substantially in order to simplify a post-treatment step." See column 6, lines 52-54.

For all of these reasons, Saito et al. does not anticipate the invention as defined in claim 1. Claims 2-14 each depends from claim 1 and is patentable over Saito et al. at least on that basis. Accordingly, the rejection of claims 1-14 under 35 U.S.C. 102(e) should be withdrawn.

Claim Rejections - 35 USC 103

1. Claims 1-14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over McCarthy et al. (US 5,955,556) in view of Saito et al.

Regarding the limitation of claim 1, the Office Action indicates that McCarthy et al. disclose the preparation of a stable aqueous self-dispersible fluorinated copolymer dispersion of up to 48% polymer solids in water in the absence of surfactant due to improved conversion rate of monomer to polymer (abstract, line 1-11). McCarthy et al. are said to further disclose that during the polymerization process, fluoropolymer macromolecules are produced having inorganic, "surfactant-like" functional end groups which impart excellent latex stability to the polymer even though these end groups are present in very low concentration (column 6, line 61-

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65). McCarthy et al. furthermore disclose that copolymers can be made from combination of fluoroolefin(s) and nonfluoroolefin(s) (column 3, line 49 - column 4, line 10).

The Examiner acknowledges that the McCarthy reference is silent about using the presence of fluorinated liquids in the polymerization. Saito et al. is cited as teaching that an inactive fluorocarbon such as tetrafluoroethane or trifluoroethane can be presented in the reaction field with the polymerizable fluorinated monomer in order to obtain a higher molecular weight since the produced polymer does not dissolve in the reaction system "completely" and is in a "dispersed state" due to diluting effect (column 6, line 33-36; column 3, line 65-67; column 2, line 53-60).

Further it is asserted that the copolymers produced by Saito and McCarthy contain the same type of monomers, which can be obtained through emulsion polymerization. It is concluded, therefore, that one having ordinary skill in the art would have found it obvious to modify McCarthy's emulsion polymerization process by adding the saturated hydrofluorinated compounds such as tetrafluoroethane or trifluoroethane as taught by Saito. One would expect one advantage is that obtaining a higher molecular weight on the final product since the produced polymer being in the presence of such inactive compounds it does not dissolve in the reaction system "completely" and is in a "dispersed state" due to diluting effect.

2. Claims 1-14 have also been rejected under 35 U.S.C.. 103(a) as being unpatentable over Oxenrider et al. (US 5,453,477) in view of Saito et al.

Regarding the limitation of claim 1, it is asserted that Oxenrider et al. disclose preparation of stable aqueous fluorinated copolymer dispersion in the absence of soaps or surfactants due to improved wettability of polymer particles (abstract, line 1-12; column 3, line 18-23; column 16, line 18-31). Oxenrider et al. further disclose that copolymers can be made from a combination of fluoroolefin(s) and nonfluoroolefin(s) (column 3, line 59 - column 4, line 5; column 7, line 42-57).

The Oxenrider reference is noted to be silent about using fluorinated liquids. Saito et al. are said to teach that an inactive fluorocarbon such as tetrafluoroethane or trifluoroethane can be presented in the reaction field with the polymerizable fluorinated monomer in order to obtain a higher molecular weight since the produced polymer does not dissolve in the reaction system

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"completely" and is in a "dispersed state" due to diluting effect (column 6, line 33-36; column 3, line 65-67; column 2, line 53-60).

It is concluded that, in light of the fact that copolymers produced by Saito and Oxenrider are containing the same type of monomers, which can be obtained through emulsion polymerization, one having ordinary skill in the art would have found it obvious to modify Oxenrider's emulsion polymerization process by adding the saturated hydrofluorinated compounds such as tetrafluoroethane or trifluoroethane as taught by Saito. One would expect one advantage is that obtaining a higher molecular weight on the final product since the produced polymer being in the presence of such inactive compounds it does not dissolve in the reaction system "completely" and is in a "dispersed state" due to diluting effect.

Response to Claim Rejections - 35 USC 103

Applicants respectfully traverses both of the rejections under 3 USC 103.

1. While McCarthy et al. do describe aqueous emulsion polymerization, McCarthy et al. fail to teach the inventive process defined by claim 1, as conceded by the Examiner. Furthermore, as discussed above, Saito et al. suggest only suspension or solvent-polymerization under supercritical conditions, where either a liquified monomer or a liquified fluorocarbon acts as the supercritical polymerization media. Saito et al. fails to teach an emulsion polymerization process.

Obviousness cannot be established "by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion that the combination be made." *In re Stencel*, 828 F.2d 751, 755, 4 USPQ 2d 1071, 1073 (Fed. Cir. 1987). Such a suggestion is clearly lacking where one or more of the relied upon prior art references teaches away from the claimed invention. Saito et al. teaches away from the use of emulsion polymerization, as well as specifically teaching away from the use of water. The emulsion polymerization of McCarthy et al. is a fundamentally different process from the supercritical fluid polymerization of Saito et al. As a result, it would be improper to combine McCarthy et al. and Saito et al. as suggested by the Examiner.

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2. Oxenrider et al., in contrast to the inventive aqueous emulsion polymerization process discovered by applicants and defined in claim 1, is directed to suspension polymerization. Oxenrider et al. fail to describe any aqueous emulsion polymerization processes other than the cursory mention of emulsion polymerization as one prior art method of preparing fluoropolymers (see e.g., column 1, lines 43-49, "There are presently known a plurality of processes which were suitable for the formation of the homopolymer, polychlorotrifluoroethylene. High molecular weight homopolymers and copolymers of PCTFE may be prepared by free radical initiated polymerization either as bulk, suspension, or aqueous emulsion via the use of a suitable initiator system or in the alternative by ionizing radiation."). Suspension polymerization, however, is distinguished from emulsion polymerization, for example, at page 3, lines 2-9 of the specification.

In addition, as discussed above, Saito et al. suggest only suspension or solvent-polymerization under supercritical conditions, where either a liquified monomer or a liquified fluorocarbon acts as the supercritical polymerization media. Like Oxenrider et al., Saito et al. fails to teach an emulsion polymerization process as defined by claim 1.

Thus, even if Oxenrider et al. and Saito et al. could be properly combined, the combination would not be an aqueous emulsion polymerization as claimed. The Office Action fails to set forth a prima facie case of obviousness of claims 1-14 based upon Oxenrider et al. and Saito et al.

It is therefore requested that the Examiner reconsider and withdraw both of the rejections of claim 1 under 35 USC §103. Claims 2-14 each depends from claim 1 and is patentable over the references at least on that basis, and the rejections of these claims should also be withdrawn.

Conclusion

For all of the reasons discussed above, favorable reconsideration of the application and the passing of the case to issue with all claims allowed is courteously solicited. Should the

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Examiner wish to discuss any aspect of this application, applicants' attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,

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